

2011 MCAS Exam Test Items

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Test item alignment to
Energy 1: Integrating Sciences through Energy
Questions 3,4,10,12,15,16 & 19 directly align.

XVI. Science and Technology/Engineering,
Grade 5

Grade 5 Science and Technology/Engineering Test

The spring 2011 grade 5 MCAS Science and Technology/Engineering test was based on learning standards in the Massachusetts *Science and Technology/Engineering Curriculum Framework* (2006). The *Framework* identifies four major content strands, listed below. Page numbers for the grades 3–5 learning standards appear in parentheses.

- Earth and Space Science (*Framework*, pages 26–29)
- Life Science (Biology) (*Framework*, pages 46–49)
- Physical Sciences (Chemistry and Physics) (*Framework*, pages 64–66)
- Technology/Engineering (*Framework*, page 86)

The *Science and Technology/Engineering Curriculum Framework* is available on the Department website at www.doe.mass.edu/frameworks/current.html.

In test item analysis reports and on the Subject Area Subscore pages of the MCAS *School Reports* and *District Reports*, Science and Technology/Engineering test results are reported under four MCAS reporting categories, which are identical to the four framework content strands listed above.

Test Sessions

The MCAS grade 5 Science and Technology/Engineering test included two separate test sessions. Each session included multiple-choice and open-response questions. Approximately half of the common test items are shown on the following pages as they appeared in test booklets.

Reference Materials and Tools

The use of bilingual word-to-word dictionaries was allowed for current and former limited English proficient students only, during both Science and Technology/Engineering test sessions. No other reference tools or materials were allowed.

Cross-Reference Information

The tables at the conclusion of this chapter indicate each released and unreleased common item's reporting category and the framework learning standard it assesses. The correct answers for released multiple-choice questions are also displayed in the released item table.

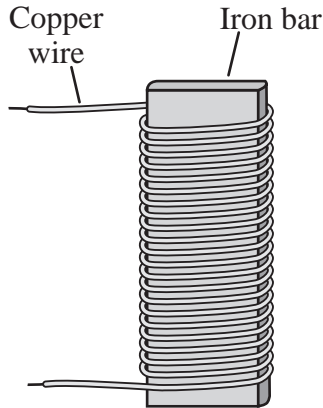
Science and Technology/Engineering

SESSION 1

DIRECTIONS

This session contains seven multiple-choice questions and one open-response question. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

- 1 Stacie wants to make an electromagnet using a copper wire wrapped around an iron bar, as shown below.

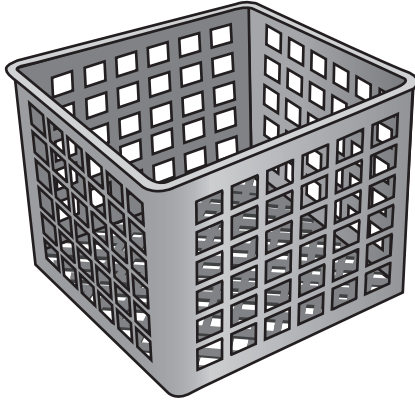


To make the bar an electromagnet, what should Stacie do next?

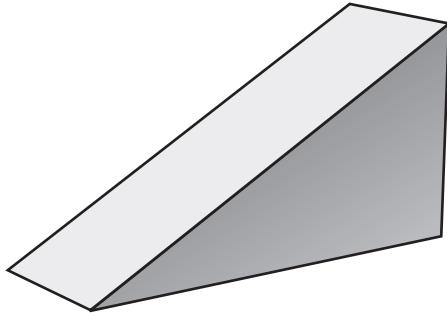
- A. connect the wire to a bulb
- B. heat the wire around the bar
- C. send a current through the wire
- D. touch the ends of the wire together

- 2 Which of the following objects is an example of a simple machine?

A.



B.



C.



D.



- 3 In a city near the ocean, fog often forms on summer mornings. Which of the following statements **best** explains how this fog forms?

- A. Ocean water evaporates and then condenses in the air.
- B. Crashing waves spray tiny drops of ocean water into the air.
- C. Water runoff moves toward the ocean and collects near the shore.
- D. Rain clouds move in from the ocean and evaporate as they reach the shore.

- 4 Chris left a glass of water on a windowsill. When he looked at the glass a few days later, some of the water had evaporated.

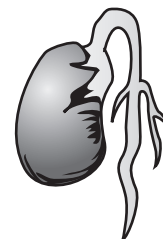
Which of the following **best** describes what happened to the particles of water that evaporated?

- A. They became larger in size.
- B. They spread out into the air.
- C. They were absorbed by the glass.
- D. They passed through the glass into the air.

- 5 Which of the following can be caused by weathering?

- A. cracks forming in a boulder
- B. rocks melting to form magma
- C. glaciers forming on a mountainside
- D. pebbles combining to form a large rock

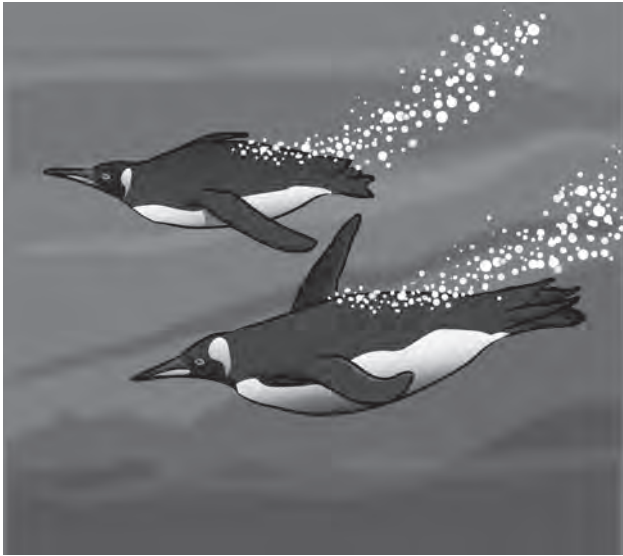
- 6 The drawing below shows a plant during the early development stage in its life cycle.



Under normal conditions, which of the following will occur **next** as the plant continues to grow?

- A. Fruits and roots will develop.
- B. Seeds and stems will develop.
- C. Stems and leaves will develop.
- D. Flowers and fruits will develop.

- 7 Emperor penguins are specialized birds that eat fish. Emperor penguins have developed many special characteristics that help them survive in the ocean environment. The picture below shows two emperor penguins swimming in the ocean.



Which of the following characteristics **most** helps the emperor penguins survive in an ocean environment?

- A. having very little sense of smell
- B. having a very weak sense of taste
- C. having large feathers that absorb water
- D. having small wings that move like flippers

Question 8 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 8 in the space provided in your Student Answer Booklet.

8 Massachusetts is home to many plants and animals, including the organisms in the list below.

- maple tree
- monarch butterfly
- robin
- squirrel

Each of these organisms responds to seasonal changes with specific behaviors.

- a. Identify **one** organism from the list that migrates.
- b. Describe **one** seasonal change that causes organisms to migrate.
- c. Describe **two** behaviors that allow organisms that stay in Massachusetts all year to survive seasonal changes.

Science and Technology/Engineering

SESSION 2

DIRECTIONS

This session contains twelve multiple-choice questions and one open-response question. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

- 9 Which of the following statements **best** describes sandy soils?
- A. Sandy soils allow water to drain quickly.
 - B. Sandy soils easily break down into clay sediments.
 - C. Sandy soils hold plant roots tightly in place to prevent erosion.
 - D. Sandy soils have high levels of decomposed plant and animal matter.

- 10 Which two forms of energy could **best** be used to increase the temperature of a sheet of copper?
- A. heat and light
 - B. heat and sound
 - C. light and magnetism
 - D. electricity and sound

- 11 Which of the following **best** explains why electrical wires are usually covered with plastic or rubber?
- A. to insulate the electrical wire
 - B. to keep the electrical wire warm
 - C. to make the electrical wire stronger
 - D. to make the electrical wire more flexible

- 12 The Sun is the largest body in the solar system. The Sun is a
- A. moon.
 - B. planet.
 - C. satellite.
 - D. star.

- 13 A student made the drawing below to show the order of several phases of the Moon. One of the phases is missing.



Which of the following pictures shows the phase of the Moon that is missing from the drawing?

- A.
- B.
- C.
- D.

- 14 Jose has two bar magnets. He pushes the ends of the two magnets together and then he lets go. The magnets move quickly apart.

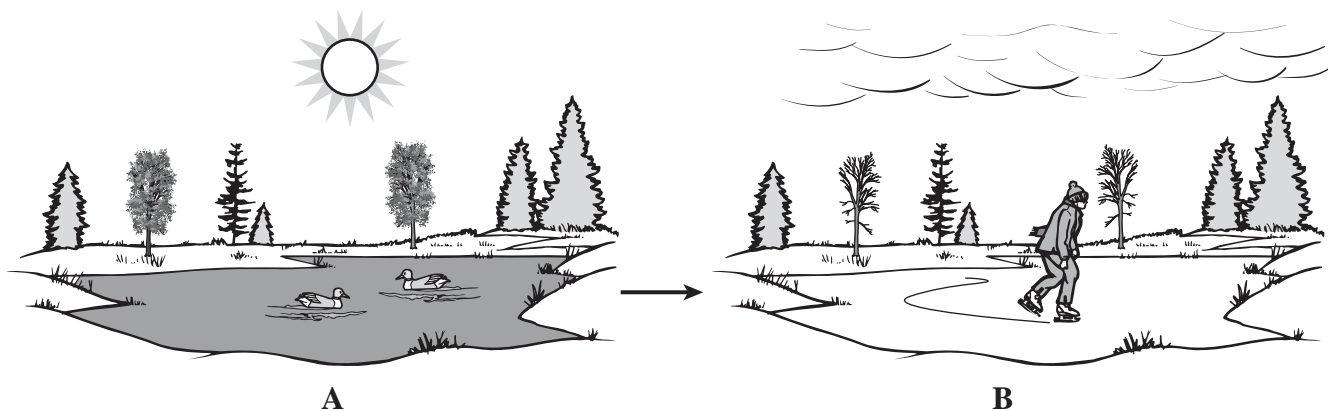
Which of the following statements **best** explains why this happens?

- A. The north poles of the two magnets are facing each other.
- B. One magnet is a north pole and one magnet is a south pole.
- C. The ends of magnets repel each other but the centers attract.
- D. One magnet is storing energy and one magnet is releasing energy.

- 15 Which of the following organisms would **most likely** get its food energy only from consumers?

- A. deer
- B. grass
- C. hawk
- D. mushroom

- 16 A pond is pictured below in two different seasons.



Which of the following has caused the changes in the pond from A to B?

- A. The pond water has lost heat energy.
- B. The pond water temperature has increased.
- C. Warm water has risen to the top of the pond.
- D. All of the water has evaporated from the pond.

17 Which of the following **best** describes a mineral?

- A. the main nutrient in all foods
- B. a type of grain found in cereals
- C. a natural substance that makes up rocks
- D. the decomposed plant matter found in soil

18 Two geese mate and raise their goslings (baby geese) each year. The table below shows the number of goslings that survive each year over a five-year period.

Year	Number of Goslings That Survive
1	6
2	2
3	4
4	6
5	5

Which of the following statements **best** explains why a different number of goslings survives each year?

- A. The goslings develop different adaptations each year.
- B. Different environmental conditions affect the goslings each year.
- C. Some goslings inherit more traits from one parent than from the other.
- D. The environmental conditions affect the parent geese more than the goslings.

- 19 The table below shows averages of temperature and precipitation for the past 20 years in an area in the United States.

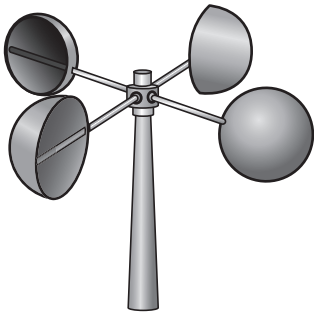
20-Year Averages

Months	Average Temperature (°F)	Average Precipitation (in.)
Jan.–Mar.	52	0.6
Apr.–June	75	0.2
July–Sept.	87	0.4
Oct.–Dec.	56	0.3

For which of the following would these data be **most** useful?

- A. understanding the climate of the area
- B. showing the effect of weather on climate
- C. predicting how the weather will change from day to day
- D. demonstrating the difference between weather and climate

- 20 The picture below shows a weather instrument.



What is this weather instrument designed to measure?

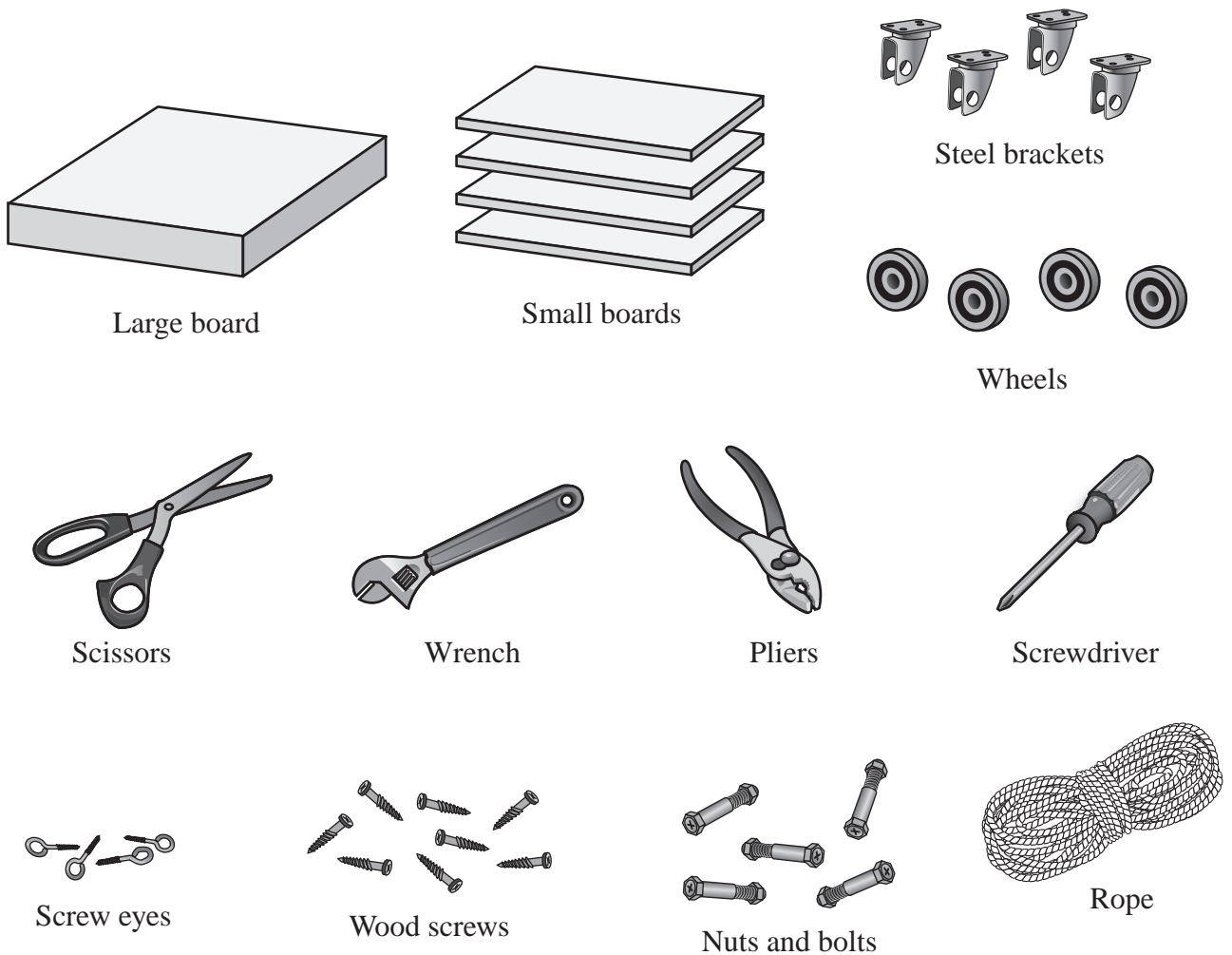
- A. air temperature
- B. rainfall amount
- C. snowfall amount
- D. wind speed

Question 21 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 21 in the space provided in your Student Answer Booklet.

- 21** A group of students is building a cart with some of the materials and tools shown below. The cart will be used to move boxes between classrooms.



- Identify which type of fasteners would be **best** for attaching the wheels to the steel brackets.
- Identify **two** tools that could be used to attach the wheels to the steel brackets with the fasteners you identified in part (a).

The students attach the wheels and brackets to the large board. They pull the cart with a piece of rope. When the students use the cart to move a box, however, the box slides off the cart.

- Describe how the students could improve the cart so that the box stays on the cart when the students move it. Be sure to identify which materials and tools the students should use.

**Grade 5 Science and Technology/Engineering
Spring 2011 Released Items:
Reporting Categories, Standards, and Correct Answers***

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC)*
1	271	<i>Physical Sciences</i>	8	C
2	272	<i>Technology/Engineering</i>	1.3	B
3	272	<i>Earth and Space Science</i>	11	A
4	273	<i>Physical Sciences</i>	2	B
5	273	<i>Earth and Space Science</i>	12	A
6	273	<i>Life Science</i>	3	C
7	274	<i>Life Science</i>	6	D
8	275	<i>Life Science</i>	9	
9	276	<i>Earth and Space Science</i>	5	A
10	276	<i>Physical Sciences</i>	4	A
11	276	<i>Physical Sciences</i>	7	A
12	276	<i>Earth and Space Science</i>	13	D
13	277	<i>Earth and Space Science</i>	15	A
14	277	<i>Physical Sciences</i>	9	A
15	277	<i>Life Science</i>	11	C
16	278	<i>Physical Sciences</i>	3	A
17	279	<i>Earth and Space Science</i>	1	C
18	279	<i>Life Science</i>	5	B
19	280	<i>Earth and Space Science</i>	9	A
20	280	<i>Earth and Space Science</i>	6	D
21	281	<i>Technology/Engineering</i>	1.2	

* Answers are provided here for multiple-choice items only. Sample responses and scoring guidelines for open-response items, which are indicated by shaded cells, will be posted to the Department's website later this year.

**Grade 5 Science and Technology/Engineering
Spring 2011 Unreleased Common Items:
Reporting Categories and Standards**

Item No.	Reporting Category	Standard
22	<i>Earth and Space Science</i>	1
23	<i>Life Science</i>	8
24	<i>Life Science</i>	7
25	<i>Technology/Engineering</i>	2.4
26	<i>Physical Sciences</i>	3
27	<i>Technology/Engineering</i>	1.1
28	<i>Physical Sciences</i>	12
29	<i>Life Science</i>	1
30	<i>Life Science</i>	4
31	<i>Physical Sciences</i>	5
32	<i>Physical Sciences</i>	7
33	<i>Life Science</i>	4
34	<i>Technology/Engineering</i>	2.3
35	<i>Physical Sciences</i>	10
36	<i>Life Science</i>	2
37	<i>Earth and Space Science</i>	7
38	<i>Earth and Space Science</i>	4
39	<i>Life Science</i>	6
40	<i>Life Science</i>	10
41	<i>Earth and Space Science</i>	2
42	<i>Earth and Space Science</i>	14